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ABSTRACT

This report summarizes the results of a survey of 29 southern land-grant institutions which elicited information on microcomputer capabilities, programming efforts, and computer awareness education for formers, homemakers, community organizations, planning agencies, and other end users. Five topics were covered by the survey: (1) degree of organization of computer applications; (2) computer applications staff and staff development; (3) research and development of software for end users; (4) hardware; and (5) software distribution. Responses to the survey indicated that end users expected the universities' extension and research departments to provide them with assistance in hardware and software selection, training in the use of computers, help in interpreting and applying computer output, and the organization of science and associated technological information into databases for their efficient and timely use. The responses also indicated that the current status of computer application programs was still largely developmental in the five areas studied; three microcomputers, Radio Shack, Apple, and IBM, were most widely used by the institutions; and resource sharing was being promoted among the universities. A copy of the survey instrument is appended. (CGD)

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Status of Computer Applications in the Southern Land-Grant Institutions Experiment Stations/Extension Services/Resident Instruction

Jane Rendiero and William W. Linder

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STATUS OF COMPUTER APPLICATIONS

IN THE SOUTHERN LAND-GRANT INSTITUTIONS

EXERPIMENT STATIONS/EXTENSION SERVICES/RESIDENT INSTRUCTION

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and

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INTRODUCTION

In recent years, microcomputers have increased in capabilities while decreasing in cost, and the growth rate of personally owned microcomputers has accelerated. Use of microcomputers is expanding into most disciplines, and farming is no exception. Farmers and other agricultural users are increasingly purchasing their own microcomputers, and are consequently in need of appropriate software as well as education and training in the use of computers.

Many of the 29 Southern land-grant institutions have responded to developing a substantial variety of software programs for end users, but each agency has different goals and objectives in these endeavors. Only a few of these universities have established policies and organizations for regulation of software development, maintenance, support and distribution. As other institutions begin to develop similar policies and standards, it will be advantageous to consider the possibility of resource-sharing. Lack of standardization and communication lead to duplication of effort, higher costs of software development and distribution and inconsistencies in standards for equipment, operating systems, languages, and documentation. In order to continue to improve delivery of computer software and services to the agricultural community, it is becoming necessary to share information and knowledge, and establish working relationships between those Southern land-grant institutions working on end user software development.

With this purpose in mind, the Southern Rural Development Center conducted a survey of each dean and director of research, extension, and resident instruction at the divisions/colleges of agriculture at the 29 Southern land-grant institutions. The survey inquired about each institution's current computer capabilities and programming efforts. Five general topics relating to end user software were covered by the survey: degree of organization of computer applications, computer applications staff, software research and development, hardware, and software distribution. Questions covered a variety of areas within each topic; i.e., what software programs are available for distribution or are under development, how many faculty and other staff are responsible for software development, what types of computer equipment are used, what types of training and workshop opportunities are offered, and what policies are in existence for the distribution of software to end users. The results of the survey follow, and it is hoped that they will promote the development of resource-sharing among the institutions surveyed through increased communication and general awareness of the problems involved. This summary of computer capabilities and programming efforts for the end user at each Southern land-grant institution may aid in the eventual establishment of available software inventories, personnel inventories, and standards for software and equipment.

ORGANIZATION OF COMPUTER APPLICATIONS WITHIN THE INSTITUTIONS

The purpose of one section of the survey was to determine the degree of structure and organization of computer applications projects at each participating institution, particularly in the college of agriculture and its subdivisions: research, extension and resident instruction. Responses indicate there is a wide variation in the amount of organizational structure in existence for the coordination of computer applications within the institutions, ranging from loose, departmentalized controls to highly structured ones coordinated at the university-wide level.

In the survey, each institution was asked to indicate whether or not it has centralized computer coordinating committees on one or more of five different levels within the institution: the university-wide level, the college of agriculture-wide level, or on the levels of experiment stations, extension services, or resident instruction. More of the responding institutions (14 of them) report computer coordinating committees at the university-wide level than at any other more localized level. Ten have college of agriculture-wide committees, five have them at the experiment station level, 10 at the extension service level, and seven have computer coordinating committees at the resident instruction level. Most have these committees at more than one of the levels. Two institutions--Mississippi State University and the University of Georgia--report they have computer coordinating committees at all five levels,

six have them at two of the five levels, and one institution--Oklahoma State University--has a computer coordinating committee at only one of the five levels (at the college of agriculture-wide level). Five institu-- tions (Alcorn State University, Kentucky State University, Langston University, Tuskegee Institute and the University of Puerto Rico) report- edly have no computer coordinating committee at any of these five levels, and eight institutions (Florida A&M University, North Carolina A&T State University, Prairie View A&M University, South Carolina State College, Southern University, University of Arkansas at Pine Bluff, Virginia Poly- technic Institute and State University and Virginia State University) did not respond to the question. See Table 1.

In another question related to the organization and structure of each institution's computer applications project, each institution was asked whether or not there exists a coordinated organizational structure for computer applications throughout the college or division of agriculture generally, or more specifically in the areas of research, extension and resident instruction. Seven replied affirmatively to the question, going on to describe their organizational structures. These structures are of three general, sometimes overlapping types. One type--reported in use at Auburn University, the University of Arkansas, the University of Florida and the University of Georgia--has a single committee which consists of advisors from each different area (research, extension and resident instruction). The committee coordinates computer projects of each of the areas, and makes recommendations to the dean or other head of the college of agriculture. A second type of coordinating structure reported has several different advisory and program committees, each usually representing a different area from within the college of agriculture.

TABLE 1

Coordinating Committees

Institution *	University wide	Agriculture wide	Experiment wide	Extension wide	Resident Instruction
Alabama A&M	yes	no	no	no	yes
Alcorn State	no	no	no	no	no
Auburn	yes	yes	no	no	no
Clemson	yes	yes	no	yes	no
C. of Virgin Islands	yes	no	yes	--	no
Fort Valley	yes	no	no	yes	no
Kentucky State	no	no	no	no	no
Langston	no	no	no	no	no
Louisiana State	yes	no	no	yes	yes
Mississippi State	yes	yes	yes	yes	yes
North Carolina State	---	yes	yes	yes	yes
Oklahoma State	no	yes	no	no	no
Tennessee State	yes	yes	no	---	---
Texas A&M	yes	no	no	yes	yes
Tuskegee	no	no	no	no	no
U. of Arkansas	yes	yes	no	yes	no
U. of Florida	yes	yes	no	no	no
U. of Georgia	yes	yes	yes	yes	yes
U. of Kentucky	yes	yes	no	yes	no
U. of Puerto Rico	no	no	no	no	no
U. of Tennessee	yes	no	yes	yes	yes
Totals Yes	14	10	5	10	7
No	6	11	16	9	13

*No response was received from Florida A&M, North Carolina A&T, Prairie View A&M, South Carolina State, Southern, University of Arkansas at Pine Bluff, Virginia Tech, and Virginia State.

Although it varies somewhat from institution to institution, advisors from each of these different committees generally report to a centralized coordinating committee. Mississippi State and North Carolina State University use this type of structure. The third type of organized structure for computer applications reported is the system used by the University of Kentucky. At that institution, the college of agriculture has its own computing center, with a director and consultants who coordinate all computer functions within the college. Department heads are responsible for program activity within their departments.

In addition to the seven who responded affirmatively to the question of whether they have a coordinated organizational structure for their computer applications throughout the college or division of agriculture, 14 replied negatively; however, most of these did describe alternative organizational structures used by their institutions for the coordination of computer applications, indicating that some type of computer applications work is in progress. In general, these 14 institutions reported either fewer computer projects and facilities or less overall organization and structure for their computer activities. Again, although the types of organizations tend to have common features, several distinct types can be identified. Several institutions reported that their computer coordination is departmentalized, while several others go through the university computing center. Other examples of systems used to organize and coordinate computer applications within the college of agriculture are the use of program leaders (College of Virgin Islands) and computer task forces (University of Tennessee).

In summary, the degree and type of organizational structure used to coordinate computer projects by the institutions vary greatly, but are

almost universally in existence in some form. While some universities have highly structured, university-wide procedures and policies for coordinating computer applications, others have little or no established policy or structure. Types of systems used are computer coordinating committees at one or more levels, departmental control, control through a department of agriculture computer center, use of the university computer center, program leaders and computer task forces. These types of coordinating stuctures are used in various degrees and combinations, and the results are vastly different degrees of organization and structure of computer applications at each institution.

STAFF

Crucial to the success of computer applications programs at the subject institutions is the computer applications staff. Several survey questions were created for the purpose of exploring the level of staff and staff development programs. The questions concerned level of expertise, availability of staff training, whether or not there is a reward system for software development/distribution, and the ease or difficulty of acquiring professional staff to support computer applications.

Staff training in computer applications was divided into three areas on the survey--extension, research and resident instruction--and a description of current efforts in staff training in each area was requested. Survey responses indicate a wide variety of training techniques are in use: courses offered by the computer center, introductory courses within departments, short courses, courses for credit, graduate-level courses, labs, workshops, seminars, company-sponsored workshops, regional meetings, slide shows, video presentations, in-service training, on-the-job training, and off-campus self-improvement workshops.

At the extension level, staff training efforts appear to be focused on the microcomputer, with the end user in mind. In other words, extension staff are frequently trained not only in microcomputer use for their administration and operational purposes, but also in how to pass necessary microcomputer knowledge on to end users. For instance, Auburn, Louisiana State University, Mississippi State, University of Arkansas, Texas A&M

University and the University of Kentucky all have training programs on this level dealing specifically with microcomputers. The five-hour program at Louisiana State introduces parish (county) level staff to on-farm concepts and terminology, applications, and demonstrations of selected programs for office administration, educational and service work. Texas A&M offers microcomputer awareness training programs with hands-on subject matter training in the use of the tool in an agricultural perspective. Mississippi State has developed four slide sets on microcomputer use. The University of Arkansas offers a 12-hour workshop for 54 state staff on microcomputers orientation and a three-hour credit course for eight state staff on microcomputer language. Besides these efforts in microcomputer staff training, various other types of staff training are being developed and conducted at the extension level in these institutions. Techniques of training at this level are usually workshops, seminars and voluntary courses. North Carolina State, for instance, offers a formal three-week summer course for agents and specialists. Mississippi State offers a graduate-level staff development course at the extension level as well as individualized instructions and video programs. The University of Georgia has computer awareness and training for county agents and state specialists; the University of Tennessee taught in-service seminars for all extension agents working with adult agriculture in the fall of 1982 and for home economics agents in the spring of 1983. Another common type of staff training at the extension level is orientation programs for new computer equipment. These programs are sometimes taught by the computer manufacturer and sometimes by the institution. Other areas of training and staff development at the extension level are communications, use of electronic spreadsheets, use of data base management

software, use of word processing software, Fortran, computer concepts, terminology, and office administration. Ten of the 29 universities surveyed did not respond to the question concerning extension staff development (Florida A&M, Kentucky State, North Carolina A&T, Prairie View A&M, South Carolina State, Southern, Tennessee State University, Tuskegee, Virginia Tech, and Virginia State), and three responded but indicated they have no such programs at this time (Alabama A&M, College of Virgin Islands, and the University of Puerto Rico).

Training programs in computer applications for research staff are apparently much less formalized than those at the extension level. Often, institutions expect their research staff to learn computer applications on their own rather than from a university-supplied training program. They assume researchers have received adequate training in their individual specialized training and graduate studies for use in their research. Responses from Texas A&M and Alabama A&M, among others, reveal this tendency, while Fort Valley State University, North Carolina State, the University of Arkansas, and the University of Tennessee responded to this "research staff development" section of the survey with either a blank or the word "NONE." Apparently, several institutions are now in the process of developing staff training programs for researchers. Auburn, for instance, is conducting workshops which stress applications rather than research, hoping to encourage more of the research staff to begin developing microcomputer applications in various disciplines. The College of Virgin Islands, Langston and Oklahoma State also indicate work toward developing staff training programs for researchers. Many of the responding institutions, however, do offer some training at

the research level, in the form of workshops, voluntary college courses, or short courses, taught by computer centers, computer manufacturers, computer science or statistics departments, or within departments. Workshops and college courses are the methods used by the University of Georgia, Tuskegee, Mississippi State, and Alcorn State. Mississippi State staff participate in a formal one-hour graduate "block" course in microcomputing (five weeks). At the University of Georgia, workshops and seminars are scheduled on a regular basis for research staff concerning computer services and statistical applications software. University-wide computer centers offer short courses for interested researchers at Kentucky State, Clemson University, Mississippi State and the University of Kentucky. Clemson's computer center, for example, offers one-hour to three-day courses on such topics as SAS, JCL, and word processing. At Mississippi State short courses (usually one to five days) are held by the computer center on an ad hoc basis. The Department of Experimental Statistics at Louisiana State provides courses in statistical analysis and other computer applications to researchers on the staff there. At Oklahoma State, all staff training, including that at the research level, is done within departments. In general, then, staff training efforts now in progress at the participating institutions for research staff focuses on both statistical analysis for research functions, and other computer applications. It is usually voluntary and less formalized than staff training at the extension level, since it is often assumed that researchers already possess the computer applications knowledge they need.

Efforts in staff training at the resident instruction or teaching level are similar to those at the research level. They tend to focus

on three general areas of computer applications: statistical analysis, computer-assisted instruction, and general computer applications awareness. Voluntary college courses, workshops and short courses are the chief training vehicles at this level. Alabama A&M offers monthly short courses on computer-assisted instruction, and the University of Georgia offers similar seminars on a less regular basis. Clemson offers training sessions for the use of their microcomputer lab so that teaching faculty can keep up with software developments. Texas A&M has offered a college-wide computer workshop annually for two years to aid in staff development in computer applications, and various department workshops have been conducted. North Carolina State offers its faculty one and two-day courses on BASIC, general applications software such as word processing and electronic spreadsheet programs, and specific agricultural applications programs. The University of Arkansas has developed two courses for the purpose of training its teaching staff--the Introduction to Microcomputers and Agricultural Applications of Microcomputers. Alcorn State, Texas A&M, Auburn, University of Kentucky, University of Florida, Louisiana State and the University of Puerto Rico all offer a variety of workshops and college courses for staff training at the teaching level. At Mississippi State, "self improvement" is the key word, according to the survey response. Faculty and staff participate in seminars, workshops and symposia both on and off campus for this purpose. As with staff training at the research level, many institutions admit they have no formal training programs for staff at the resident institution level. The College of Virgin Islands, Fort Valley State, Kentucky State and the University of Tennessee apparently have no such program, while Langston is in the process of developing one.

In the area of staff training, then, programs are generally being developed in response to the rising need and demand for such training. Several respondents indicate their efforts have been very well received, and thus are in the process of expanding their services. Oklahoma State learned in a recent survey of its own that faculty and staff desire a wide range of short courses on topics such as spreadsheets, word processing, data base management, mainframe communications, literature search and retrieval, etc. Auburn's workshops have proven successful, and more are planned, because Auburn sees a dual advantage in staff training: in addition to the benefits of upgrading the knowledge and abilities of its faculty and staff, Auburn sees its staff training in computer applications as a potential tool for encouraging researchers to begin development of microcomputer applications in various disciplines. Formal training programs, then, in computer applications, are offered in a variety of media and topics at about half of the institutions surveyed, and there seems to be a trend toward developing more programs in response to rising need and demand.

Although appropriate staff training programs can provide incentive for professionals to develop end user software, another type of incentive may be provided by a suitable reward system. According to the survey results, however, the overwhelming majority of the Southern land-grant institutions surveyed currently have no present reward system policy for such achievements, either at the agricultural college/division level, or at the university level. At the 19 institutions which responded to this question, no specific reward system exists for computer applications as distinguished from other research publications. The system at Louisiana State is typical: the reward system there is a function of each individual's

total job performance. In addition to computer applications achievements, other factors are evaluated, such as publications, scholarly work, research results and effective teaching. The Clemson reply states that "promotion and tenure committees place less emphasis on the value of this type of work." Auburn feels there is a definite need for a formal policy treatment on this matter, while Kentucky State and the University of Georgia are reportedly developing guidelines to be used in promotional evaluation for faculty involved in computer software development. In summary, then, survey results indicate there are no specific policies for rewarding professionals involved in end user software development now in operation at any of the Southern land-grant institutions surveyed.

Another staff-related question on the survey seeks to gain information about the estimated level of expertise of district, area and county extension staff in computer applications. Sixteen institutions responded to this question. According to the results, only about 5 percent (or 270) of the 5,370 total district, area or county extension staff are judged to be qualified by training and experience to provide substantial computer leadership to their clientele; about 27 percent (or 1,438) of the total extension staff are familiar with computers but not ready to offer leadership programs; and about 69 percent (3,662) of the total are not yet familiar with computers. Out of all types of extension staff, the County Agricultural Agents were the most qualified for leadership programs, since 35 percent (585) of the 1,708 total extension agents judged to be either qualified for training or familiar with computers were County Extension Agents. Twenty-two percent (365) were Area Subject Matter Specialists, 25 percent (422) were County Home Economics Agents, 15 percent (247) were County 4-H Agents, and 6 percent (89) were District Administrative

Staff. See Table 2 for a complete analysis of the survey results by institution.

The final survey question dealing with staff issues asked whether the respondent finds it easier to acquire hardware or professional staff to support computer applications. The results are definitive: 10 of the 12 institutions who responded to this question agree that professional staff is certainly more difficult to acquire than hardware. Only at the University of Florida is staff easier to acquire than hardware, because of state budget and purchasing regulations. At Louisiana State both hardware and professional staff are almost impossible to acquire at this time, since state resources are at a very low level. The 17 institutions who did not respond to this question are: Alcorn State, College of Virginia Islands, Florida A&M, Fort Valley, Kentucky State, Langston, North Carolina A&T, Prairie View, South Carolina State, Southern, Tennessee State, Tuskegee, University of Arkansas, University of Arkansas at Pine Bluff, the University of Puerto Rico, Virginia Tech and Virginia State.

Among the 10 institutions who responded it is easier to acquire hardware than professional staff, several reasons are given. Several institutions (Alabama A&M, Auburn, Clemson, Oklahoma State) state it is difficult to find professional staff with sufficient knowledge and experience in the newer computer technologies. Mississippi State mentions the problem of finding staff with appropriate multidisciplinary skills, i.e., with both subject knowledge and technical expertise. Clemson gives another reason for the difficulty of acquiring professional staff: the perception by potential staff that software development is not a reward pursuit. Another reason cited by several universities is that state rules and budgets make it easier

TABLE 2

Level of Extension Staff Expertise in Computer Applications*

Institution	Qualified by Training and Experience to Provide Substantial Computer Leadership to Clientele					Familiar With Computers But Not Ready to Offer Leadership Programs					Not Yet Familiar With Computers				
	DAS	ASMS	CAA	HE	4-H	DAS	ASMS	CAA	HE	4-H	DAS	ASMS	CAA	HE	4-H
Alabama A & M	0	0	0	0	0	0	0	0	0	0	1	6	6	6	0
Auburn	0	1	2	0	1	1	6	40	2	1	-	-	-	-	-
Clemson	0	18	15	5	**	6	51	38	40	**	0	35	65	56	**
C. of Virgin Is.	1	-	-	-	-	3	-	1	1	-	6	6	6	4	3
Langston	-	-	-	-	-	2	6	-	-	-	-	-	0	25	1
Louisiana State	0	0	0	0	0	8	32	100	40	40	1	10	12	41	126
Mississippi State	1	1	4	1	1	1	4	15	9	8	14	18	74	75	60
N. C. State	0	2	3	0	0	14	4	65	41	23	3	14	230	125	79
Oklahoma State	4	20	10	10	5	8	15	58	58	25	-	2	15	17	23
Texas A&M	1	15	3	0	1	5	70	50	50	10	7	210	600	50	0
U. of Arkansas	0	6	4	10	0	--	--	54	10	--	5	4	23	65	21
U. of Florida	0	5	5	3	2	3	2	30	10	5	2	0	55	67	60
U. of Georgia	0	--	7	0	--	6	--	11	7	--	19	--	237	209	--
U. of Kentucky	0	20	10	18	50	12	68	30	77	50	0	15	80	37	50
U. of Puerto Rico	--	--	--	--	--	3	4	0	0	0	18	16	115	76	11
U. of Tennessee	--	5	--	--	--	10	10	30	30	25	5	68	107	111	154
Total:	7	93	63	47	60	82	272	522	375	187	81	404	1625	964	588

*DAS--District Administrative Staff; ASMS--Area Subject-Mater Specialists; CAA--County Agricultural Agents; HE--County Home Economics; 4-H--County 4-H

**Agricultural agents and home agents share 4-H responsibilities.

Institutions in the Southern region that did not respond are: Alcorn State, Florida A&M, Fort Valley State, Kentucky State, North Carolina A&T, Prairie View A&M, South Carolina State, Southern, Tennessee State, Tuskegee, University of Arkansas at Pine Bluff, Virginia State, and Virginia Tech.

to acquire hardware than professional staff. For instance, the University of Georgia and the University of Kentucky reply that one-time expenditures for hardware are easier to budget and justify than the long-term expenses of salaries. At Texas A&M, professional computer personnel are difficult to obtain since budget action is required; however, the Texas legislature has recently approved an appropriation specifically for the purpose of supporting computer applications. The reason cited most often for the difficulty of obtaining professional staff is lack of funds. North Carolina State mentioned there seems to be more interest and support for the securement of equipment than staff. They, along with Oklahoma State, cite the high cost of professional staff as an obstacle to their acquisition. The University of Tennessee and Oklahoma State are operating with vacancies because of hiring freezes and shortages of funds. Oklahoma State is delegating considerable programming to undergraduate and graduate students. They mention this may eventually be costly although it serves to provide valuable programming experience for its students.

According to the survey results, then, policies relating to computer applications staff issues are still largely in the development stages. In the area of staff training, programs are generally being developed at the extension, research and resident instruction levels in response to rising need and demand. Similarly, the level of expertise of staff in computer applications is rising with demand; however, over half of the total extension staff at all participating institutions (69 percent) were judged to be essentially unfamiliar with computers, while only 5 percent were considered qualified by training and experience to provide substantial computer leadership to their clientele. Little is being done to formulate specific policies for rewarding professionals and

other staff involved in end user software development. Rather, computer applications achievements are considered for possible rewards only in conjunction with other factors of total job performance such as publications, research and teaching. In the area of the acquisition of computer applications staff, respondents indicated it was unquestionably more difficult to acquire appropriate staff than hardware, for a variety of reasons. Computer applications staff issues at participating institutions, then, are in various stages of development, but in general, there are few policies dealing specifically with computer applications staff issues.

TABLE 3

Amount of Computer Software Program Development Performed

Institution*	20 hours	5-20 hours	5 hours	Total
Alabama A&M		1	1	2
Auburn			1	1
Clemson	5	23	2	30
Mississippi State	4	19	37	60
North Carolina State	7	23	16	46
Oklahoma State	1	4	12	17
Texas A&M	12	6	18	36
U. of Florida	2	19	25	46
U. of Georgia	2	8	14	24
U. of Kentucky	15	8	13	36
U. of Tennessee			1	1
Totals	48	111	122	281

*Institutions in the Southern region which did not respond are Alcorn State, College of Virgin Islands, Florida A&M, Fort Valley, Kentucky State, Langston, Louisiana State, North Carolina A&T, Prairie View A&M, South Carolina State, Southern, Tennessee State, Tuskegee, University of Arkansas, University of Arkansas at Pine Bluff, University of Puerto Rico, Virginia Tech and Virginia State.

SOFTWARE RESEARCH AND DEVELOPMENT

One of the major purposes of the survey was to discover the number and subject areas of end user software development programs at participating institutions. Questions were designed in an attempt to determine how much research and development of end user software is currently in progress, and what the priority areas of development are. Only 11 institutions responded to this section of the survey--Alabama A&M, Auburn, Clemson, Mississippi State, North Carolina State, Oklahoma State, Texas A&M, University of Florida, University of Georgia, University of Kentucky, and University of Tennessee.

Apparently, among the 11 responding institutions, a total of 281 people spend some amount of time designing or coding programs intended for end users--an average of 25.5 people/responding institutions. Of these, 43 spend more than 20 hours per week on these projects, 111 people spend five to twenty hours per week and 122 people spend less than 5 hours per week in end user software program development. See Table 3 for a more thorough breakdown of each institution's response. Forty-nine percent of the total number of people working on these projects work in the area of extension, 39 percent are in research, and about 12 percent are in the teaching field (See Table 4).

Survey respondents were additionally asked to list priority areas for computer applications in general--i.e., not necessarily for the end user--

TABLE 4

Primary Organizational Assignment of Individuals Designing or Coding Computer Programs

Institution	Extension	Research	Teaching	Total
Alabama A&M			1	2
Auburn		1		1
Clemson	19	11		30
Mississippi State	12	40	8	60
North Carolina State				2
Oklahoma State	8	4	5	17
Texas A&M	12	6		18
U. of Florida	18	17	11	46
U. of Georgia	19			19
U. of Kentucky	24	9½	3½	37
U. of Tennessee	1			1
Totals	113	90	29	

*Institutions in the Southern region which did not respond are Alcorn State, College of Virgin Islands, Florida A&M, Fort Valley, Kentucky State, Langston, Louisiana State, North Carolina A&T, Prairie View A&M, South Carolina State, Southern, Tennessee State, Tuskegee, University of Arkansas, University of Arkansas at Pine Bluff, University of Puerto Rico, Virginia Tech and Virginia State.

at their institutions. Responses indicate a wide variety of priority areas for general computer use. Several institutions mentioned administrative functions, data and information retrieval, financial management and statistical analysis as priority areas. Other priority areas listed were reporting and evaluation, computer assisted instruction, the development of networking, agricultural economics, rural development, aquaculture research, nutrition, simulation of plant/animal production systems, integrated pest management and weather. Several institutions (Auburn, Louisiana State, Mississippi State, North Carolina State, Oklahoma State, Texas A&M and the University of Kentucy) state that a primary goal is microcomputer/computer literacy of students, faculty and staff.

End user computer applications priority areas were listed by each university in greater detail. As confirmed by Table 5, the biggest areas of development are agricultural economics (74 people working in college of agriculture end user software development), agricultural engineering (45 people), agronomy (22), zoology and entomology (21), food and resource economics (16), animal science (15), computer applications and services (12), and forestry (11). These figures were compiled from survey responses from all but the nine institutions who did not respond (Florida A&M, North Carolina A&T, Prairie View A&M, South Carolina State, Southern, Tuskegee, University of Arkansas at Pine Bluff, Virginia Tech and Virginia State). In a separate question, it was asked how many locally-developed programs are currently in use or under development at each institution. Among responses, a total of 423 locally-developed programs are in use, while 262 more programs are in the development stages. As can be seen from Table 6, only nine institutions responded to this question.

TABLE 5

Priority Areas For Computer Applications
Number of People Working in Each State

Department	Extension	Research	Teaching	Total
Agricultural Economics	31	34	9	74
Agricultural Engineering	18	21	6	45
Agronomy	11	9	2	22
Zoology & Entomology	16	3	2	21
Food & Resource Economics	7	6	3	16
Animal Science	10	2	3	15
Computer Application & Service	10	2	0	12
Forestry	7	3	1	11
Home Economics	7	0	0	7
Sociology	3	3	1	7
Horticulture Science	6	0	0	6
Plant Pathology	4	2	0	6
Poultry Science	3	2	0	5
Dairy Science	3	1	0	4
Farm Management	4	0	0	4
Nutrition	4	0	0	4
Fruit Crops	1	1	1	3
Marketing	3	0	0	3
Economics & Business	2	0	0	2
Human Environment Design	2	0	0	2
Ornemental Horticulture	2	0	0	2
Administration	1	0	0	1
Agribusiness	0	1	0	1
Community/Rural Development	1	0	0	1
Family Studies	1	0	0	1
Food Science	0	0	1	1
Vegetable Crops	1	0	0	1
Wildlife & Fisheries	1	0	0	1
Totals	159	90	29	278

*The 20 Institutions whose responses are included in the table: Alabama A&M, Alcorn State, Auburn, Clemson, College of Virgin Islands, Fort Valley, Kentucky State, Langston, Louisiana State, Mississippi State, North Carolina State, Oklahoma State, Tennessee State, Texas A&M, University of Arkansas, University of Florida, University of Georgia, University of Kentucky, University of Puerto Rico and University of Tennessee.

TABLE 6

Number of Locally Developed Programs

Institution*	In-Use	Under Development	Total
Alabama A&M	13	6	19
Clemson	49	27	76
Mississippi State	47	40	87
North Carolina State	30	32	62
Oklahoma State	49	21	70
Texas A&M	17	23	40
U. of Florida	29	48	77
U. of Georgia	64	22	86
U. of Kentucky	96	43	139
Totals	394	262	656

*Institutions in the Southern region which did not respond are Alcorn State, Auburn, College of Virgin Islands, Florida A&M, Fort Valley, Kentucky State, Langston, Louisiana State, North Carolina A&T, Prairie View A&M, South Carolina State, Southern, Tennessee State, Tuskegee, University of Arkansas, University of Arkansas at Pine Bluff, University of Puerto Rico, University of Tennessee, Virginia Tech, and Virginia State.

A necessary part of the development of end user software programs is an appropriate review of the software for the purpose of detecting technical errors and omissions, improving clarity, and ensuring that it is up-to-date, timely, user friendly, complies with accepted standards and methodology, and is correct as to subject matter. Only three of the universities who replied to the survey question on their review processes have formal peer review procedures (Mississippi State, Texas A&M and the University of Kentucky). Mississippi State considers the review process of end user programs a continuous process. Publications and programs are reviewed by a group of formal, interdisciplinary reviewers. Care is exercised to obtain subject matter expertise as well as technical expertise, then field testing follows. Texas A&M enforces what it considers to be a "moderately rigorous review process." First, the software design is created and reviewed by subject matter specialists. Once the design has been coded, the resultant software is reviewed by subject matter specialists for content, by programmers for maintainability, and by beta-test users for user friendliness. At the University of Kentucky, all software developed in the College of Agriculture must pass through the computer software approval system before being released for general use. Here, the department chairman determines whether departmental or interdepartmental peer review is most appropriate, then initiates this process. Upon departmental approval, the associate director for extension designates a technical and editorial review and testing. Three other institutions--Oklahoma State, University of Florida and University of Georgia--describe their review processes as being less formal and remaining within the department. In these cases, the department responsible for developing an end user program is also responsible for having it reviewed before its submission for general distribution. The University of Florida

questions the procedure, since in some cases faculty in the department capable of analyzing the program from all necessary angles are limited. Auburn and North Carolina State are currently in the process of developing peer review procedures, while Clemson explains that they have no formal review; most of their review work is done by end users who have a keen interest in the programs and are willing to work in development and testing. The other 20 universities surveyed replied that either they do not distribute software to end users or have no review process.

Survey results indicate, then, that in the area of research and development of software for end users, approximately 10-11 of the 29 universities surveyed are active. Some of these, such as Mississippi State and Texas A&M, apparently have highly structured, vigorous programs in these areas, with definite procedures and standards for documentation, review, language, hardware capability, etc. Others of these 10-11 institutions are less structured, although several appear to be aware of deficiencies and in the process of correcting them. The remaining 18-19 institutions apparently do not give research and development of end user software a high priority at this time, so they have few such projects ongoing. Most work in this area is being done in the extension and research departments, and current priority areas are concentrated in agricultural topics dealing with agricultural economics and engineering, agronomy, zoology and entomology, food and resource economics, and animal science.

HARDWARE

Farmers and other potential end users are increasingly purchasing a variety of brands of microcomputers. Most departments at the universities surveyed have intelligent terminals and/or small computers, as well as access to larger university computer systems. Several problems arise relating to the use of computer hardware in the overall process of end user software development and distribution. These problems concern most particularly the difficulty of linking computers and the lack of standardization of computer programs for the purpose of compatibility. Questions in the survey address these problems by requesting inventories of the different brands of computers for which they provide software, the computer equipment available for the division of agriculture in research, teaching and extension, and any other computer facilities used. Further, the survey seeks information on the difficulty or ease with which hardware may be acquired, and whether or not state contract regulates purchase of computer hardware.

One question called for an inventory of the computer equipment available for use by the division or college of agriculture, including that used in research, extension and teaching. Twenty-one institutions provided this inventory in their survey responses. Table 7 presents a list of the types of equipment which are reported in use at two or more of the universities. The computer equipment found to be used most extensively among the institutions is six particular microcomputers.

TABLE 7

Computer Equipment in Use at Two or More
Southern Land-Grant Institutions

Manufacturer	Model	Total Number Units	Total Number Institutions
APPLE	IIE	55	9
	PC	84	9
	II	158	9
	12	90	9
	III	61	8
	II+	71	7
RADIO SHACK	I	44	5
	IV	40	5
OSBORNE	1	22	4
	16	31	4
FRANKLIN	ACE1000	22	3
	S/34	3	3
	XT	8	3
	SIL. 700	6	3
VECTOR GRAPHICS	2600	16	3
	III	3	2
COMMODORE	64	7	2
DEC	11/70	4	2
EPSON	MX80	7	2
IBM	Displaywriter	62	2
DAYPRO	II	10	2
MONROE	EC	4	2
TEXAS INSTRUMENTS	OMNI 800	2	2

The Apple IIe, IBM PC, and Radio Shack Models II and 12 are all in use at nine institutions each; Radio Shack Model II at eight; and the Apple II+ at seven. Most of the universities have multiple units of these microcomputers, and use them in various extension, administrative, research and teaching functions. The table provides a breakdown for each equipment model by research, extension, teaching and central/ administrative uses. Mississippi State, Oklahoma State, Texas A&M, University of Florida and University of Kentucky are major users and developers for both Apple and Radio Shack micros. University of Kentucky and Texas A&M are major users of the IBM Personal Computer.

Apparently, extension, research and teaching staff frequently use university-wide academic and administrative computer systems. Generally about half (or a little more) of the universities responding to this question use this type of centralized computer facility in addition to the computer equipment available locally at the college of agriculture; or in other words, about half not only use the microcomputers and other equipment listed in Table 7, but also use some version of a centralized university computer system. These systems are reportedly used for management data, program development and execution, problem solution, administration, programming practice, SAS, modeling, statistical analysis, student records, instruction, electronic mail, and special data. In the extension division, 10 universities use AGNET, 1 uses TIPLAN, and 12 use CMN.

Apple, IBM and Radio Shack microcomputers are those currently favored by end user software developers; they are the systems for which most software is being written and distributed at these institutions.

Eleven universities provided lists of those brands of microcomputers and operating systems for which they provide software, as well as the number of programs they have available for each. Eight Southern land-grant universities use and provide 123 programs for Apple, six use and provide 79 programs for IBM, and 10 use and provide 648 programs for Radio Shack microcomputers (see Table 8). The number of programs provided by these institutions, however, does not reflect the total number of distinct, original programs available, since many included in the count are developed at one university, then disseminated to others for distribution. For instance, Auburn presently only distributes software acquired from other land-grant institutions, Texas A&M provides programs developed by Mississippi State, and North Carolina State also distributes programs bought or received from other states. Operating systems currently being emphasized are CP/M and TRSDOS. Efforts are underway to convert programs among brands of hardware. For instance, at the University of Georgia, conversion of all programs for operation under CP/M for the IBM PC is in progress. At this time their programs operate with DOS on Apple II+ and Apple IIe micros. Several institutions have specified policy guidelines and standards for hardware on which they will develop software. Louisiana State, for instance, will distribute programs for Radio Shack TRS80 Models I, II and III only using RRSDOS and BASIC. At Texas A&M, approved software utilizes the CP/M operating system and is written in CB80. Hardware standards require at leas a 56K CP/M operating system using a Z80 or 8080 microprocessor based machine with an 80 column by 24 row video display. Two disk drives with a minimum of 200K each are recommended, although some software may require considerably more space. A printer capable of recognizing a form feed command and capable of using an 8 1/2

TABLE 8

Brands of Computers Used and Number of Programs Available

Institution	Apple	IBM	Radio Shack & TRS-80	Other
Alabama A&M	X(5)	X(1)		X(5)
Auburn	X	X	X	
Clemson			X (48)	
Louisiana State			X (27)	
Mississippi State	X(2)	X(3)	X (103)	
North Carolina State			X (29)	X(21)
Oklahoma State	X(17)	X(5)	X (105)	X(29)
Texas A&M	X(12)	X(17)	X (14)	X(65)
U.of Florida	X(3)		X (3)	
U. of Georgia	X(54)			
U. of Kentucky	X(30)	X(53)	X (270)	X(44)
U. of Tennessee			X (49)	
Total:	123	79		164

*Institutions in the Southern region which did not respond are Alcorn State, College of Virgin Islands, Florida A&M, Fort Valley, Kentucky State, Langston, North Carolina A&T, Prairie View A&M, South Carolina State, Southern, Tennessee State, Tuskegee, University of Arkansas, University of Arkansas at Pine Bluff, Virginia Tech, and Virginia State.

x 11 inch form is also recommended. Many universities have no established policy, but again, a degree of uniformity exists because of emphasis on CP/M and TRSDOS operating systems and certain Radio Shack, IBM and Apple microcomputers.

Universities do not seem to have as difficult a time acquiring new computer equipment as they do acquiring professional staff to support it. Ten of the 12 institutions responding to this survey question report hardware is definitely easier to acquire. Although many mention they are currently under serious budgetary restraints in all acquisitions, state regulations often favor the acquisition of hardware over the acquisition of professional staff. Budget action is often required for staff but not for hardware; generally the procedure for hardware acquisition is to apply through the usual channels for purchasing capital equipment. Many feel that since it is a one-time expense, it is easier to justify than a long-term salary commitment; and year-end funds, salary release funds and grant funds can easily be used for hardware purchases. Several different responses indicated a common perception that more interest and support exist for the purchase of equipment than staff. Only at the University of Florida is staff easier to acquire than hardware, and the reasons are, again, state regulation. A purchase request for hardware must be approved at the university, Board of Regents, Department of Education and Department of Administration levels, and in some cases, legislative approval is necessary. The 12 who responded to this question are Alabama A&M, Auburn, Clemson, Louisiana State, Mississippi State, North Carolina State, Oklahoma State, Texas A&M, University of Florida, University of Georgia, University of Kentucky and University of Tennessee.

In most states, state purchase contracts do regulate the purchase of microcomputers without specifying a brand (see Table 9). In several

TABLE 9

State Purchase Contraction Regulations on Southern Campuses

Institution	Yes	No	If yes, specify brand	Brand Specified
Alabama A&M			No	Apple & Tandy
Alcorn State	X		No	
Auburn	X		No	
Clemson	X		No	
C. of Virgin Islands		X		
Fort Valley	X		No	
Kentucky State	X		No	
Langston		X		
Louisiana State	X		No	
Mississippi State	X		No	
North Carolina State	X		Yes	Brands on State Contract
Oklahoma State		X		
Tennessee State	X		No	
Texas A&M	X		Yes	Balcones BNV-205
Tuskegee		X		
U. of Arkansas	X		No	
U. of Florida	X		No	
U. of Georgia	X		No	
U. of Kentucky		X		
U. of Puerto Rico		X		
U. of Tennessee	X		No	

*Institutions in the Southern region which did not respond are Florida A&M, North Carolina A&T, Prairie View A&M, South Carolina State, Southern, University of Arkansas at Pine Bluff, Virginia Tech, and Virginia State.

states, however, a particular brand is specified. In Texas, Balcones BNV-205 is specified and in Alabama Apple and Tandy. It is possible to buy other brands using the bid system or by obtaining special approval. Texas A&M perceives disadvantages in the state-specified brand, and admits that "everyone tries to avoid it since it's not a major brand and has no service or distribution outside of Austin."

In summary, survey questions concerning computer equipment stressed microcomputers, since they are most directly involved with end user software development. Survey responses indicate three brands of microcomputers—Radio Shack, Apple and IBM—are most widely used by the 29 land-grant universities surveyed, in research, extension and teaching functions; and likewise, the same brands are those for which software is being developed and distributed. Some universities have set standards defining those operating systems, languages and equipment for which they will develop/distribute software, while others only report that they "emphasize" certain specifications such as CP/M operating systems. The surveyed universities almost universally report that, although budgets are tight, hardware is easier to acquire than staff, generally because of state purchasing regulations. In most states, state contracts regulate the purchase of microcomputers, but it is fairly routine to manipulate the regulations to get whatever brand desired rather than a state-specified brand.

As can be seen from the survey results, a measure of microcomputer hardware standardization exists among the Southern land-grant institutions surveyed. This standardization is informal and exists in the fact that three particular brands of microcomputers and two chief operating systems are being stressed by software developers/distributors at these universities.

DISTRIBUTION

As microcomputers have increased in capability and decreased in cost in recent years, the growth rate of personally owned computers has accelerated. As a result, demand for software appropriate for a great variety of very specific purposes is also on the rise. For example, the clientele for agricultural microcomputer software includes farmers, agricultural associations, extension personnel, farm management associations, community organizations, college and high school teachers, local governments, research scientists, planning agencies, agribusiness executives, the forest industry and financial institutions, among others. Among those farms grossing over $100,000/year in the Southern states, state percentages of on-farm computers range from less than 1 percent to 15 percent (see Table 10). Alabama A&M and Oklahoma State report that 10 percent of their states' farms in this economic category have on-farm computers, and the University of Kentucky reports the high of 15 percent. Mississippi State reports that Mississippi's percentage in this area is 7 percent, followed by Louisiana State and Prairie View A&M, who report that 5 percent of their states' farms grossing over $100,000/year have computers. For those farms grossing under $100,000/year, the percentage of on-farm computers is 1 percent or less in every Southern state except Kentucky: the University of Kentucky reports that 7.5 percent of its farms in this category have computers. All states either have now or will soon have computer programs for their agricultural users, and often these programs are developed and distributed by the 29 Southern land-grant institutions surveyed, where expertise is somewhat centralized.

TABLE 10

Number of Farms by Gross Income and Percentage of On-Farm Computers

Institutions*	# Ag Producers	Over $100,000/year		Under $100,000/year	
		# Farms	% on-Farm Computers	# Farms	% on-Farm Computers
Alabama A&M	43,000	3,000	10%	40,000	1%
Auburn	57,503	4,104	1%	53,365	1%
Clemson	33,000	2,048	2%	31,382	1%
Louisiana State	33,240	3,035	5%	30,205	1%
Mississippi State	53,000	15,250	7%	37,754	1%
North Carolina State	89,367	6,993	1%	82,374	.05%
Oklahoma State	79,388	3,716	10%	75,672	1%
Prairie View A&M	185,000	13,000	5%	172,000	.25%
U. of Florida		6,500	3%	37,568	1-2%
U. of Georgia		6,639	5%	52,009	1%
U. of Kentucky	103,000	2,700	15%	100,300	7.5%
U. of Tennessee	97,036	2,5762	3%	94,464	1%

*Institutions in the Southern region which did not respond are Alcorn State, Florida A&M, Fort Valley, Kentucky State, Langston, North Carolina A&T, South Carolina State, Southern, Tennessee State, Texas A&M, Tuskegee, University of Arkansas, University of Arkansas at Pine Bluff, University of Puerto Rico, Virginia Tech and Virginia State.

As discussed in the SOFTWARE section of this report, approximately 10-11 of the 29 universities surveyed are currently active in the area of research and development of software for distribution to end users. Mississippi State and Texas A&M, among others, have highly structured, vigorous programs with defined standards and procedures; others are less structured in their approach. Most work in this area is being done in the extension and research departments, and current priority areas of agricultural topics are agricultural economics and engineering, agronomy, zoology and entomology, food and resource economics, and animal science.

These institutions' policies on distribution of this software to end users is highly variable. Twelve of the 29 Southern land-grant institutions surveyed replied affirmatively to the question of whether they distribute software to end users; nine replied negatively, and eight did not reply at all. See Table 11 for details.

Software distribution policies vary somewhat but are generally operated on a diskette exchange basis, with a small $5.00-10.00 fee charged by the institution to cover expenses. Several institutions distribute information only through their extension services, while others distribute directly to the public. Auburn, North Carolina State, Texas A&M, the University of Kentucky and others provide software catalogs or other source listings upon request, and some have set standards for operating systems, as discussed in the HARDWARE section of this report. For example, at Texas A&M, approved software utilizes the CP/M 2.2 operating system and is written in the CB80 (BASIC native code compiler) language. Software developed which does not conform to these standards is distributed but not supported. Policies for distribution to out-of-state users are generally identical to those for in-state users. Out-

TABLE 11

Distribution of Software to End Users by Southern Institutions

Institution	Yes	No
Alabama A&M	X	
Alcorn State		X
Auburn	X	
Clemson	X	
College of Virgin Islands		X
Fort Valley		X
Kentucky State		X
Langston		X
Louisiana State	X	
Mississippi State	X	
North Carolina	X	
Oklahoma State	X	
Tennessee State		X
Texas A&M	X	
Tuskegee		X
U. of Arkansas		X
U. of Florida	X	
U. of Georgia	X	
U. of Kentucky	X	
U. of Puerto Rico		X
U. of Tennessee	X	

*Institutions in the Southern region which did not respond are Florida A&M, North Carolina A&T, Prairie View A&M, South Carolina State, Southern, University of Arkansas at Pine Bluff, Virginia Tech and Virginia State.

of-state distribution, however, is generally conducted through the different states' cooperative extension services, or requests may be referred to their respective states. Mississippi State's policies for out-of-state distribution are more clearly defined than other institutions': as a state requests Mississippi State's software, a contact person in that state's cooperative extension service is established. This person will receive the Mississippi State software library and be responsible for distribution within that state. Software is provided to other states on a diskette exchange basis, as it is for in-state distribution and a state is free to distribute Mississippi State's software according to its own policies; however the state receiving Mississippi State's software must also agree to provide its software to Mississippi State on a similar basis. At Texas A&M, software is distributed directly to out-of-state users, but they must remit 50 percent more than the normal in-state user.

As mentioned above, categories of end users served by these institutions are farmers, homemakers, agribusiness, community organizations, agricultural associations, planning agencies, local governments, forest industry, 4-H, mining industry, financial institutions, and students. As illustrated by Table 5, the biggest areas of development for end user computer applications are agricultural economics, agricultural engineering, agronomy, zoology and entomology, food and resource economics, animal science, computer applications and services, and forestry. A total of 423 locally developed programs are currently in use in these fields at the nine institutions which responded to this section of the survey, while 262 more are in the development stages. When divided into category

of end user, the following number of programs are available for each category at the Southern institutions (see Table 12):

(1) farmers--an average of 28 programs available at each of the 11 institutions reportedly serving this category of end user;

(2) agribusiness--an average of 16 programs available at each of the 11 institutions reporting service to this category of end user;

(3) agricultural agencies--15 programs/institution, six institutions reporting;

(4) agricultural associations--15 programs/institution, five institutions reporting;

(5) homemakers--seven programs/institution, with 10 institutions reportedly serving this category of end user;

(6) planning agencies--average of three programs/institution, with six institutions reporting;

(7) community organizations--average of 2.5 programs/institution, with eight institutions reporting; and

(8) three programs in government (Mississippi State), one in financial investment (Oklahoma State), one in the forest industry (Oklahoma State), one in 4-H (University of Florida), five in the mining industry (University of Kentucky), 70 for youth (University of Kentucky), and 10 for students (University of Florida).

As can be seen, more software is currently available for farmers and other agricultural-type end users than for homemakers, community organizations, planning agencies, etc.

At most institutions which provide software to end users, other services than software are provided also. Fifteen of the 29 institutions

TABLE 12

Categories of End-Users Served and Number of Programs Available in Southern Institutions

	farmers	agri-business	home-makers	comm. organ.	plan. ag.	agri. ag.	ag. assoc.	other
Alabama A&M								
Alcorn State								
Arkansas A&M								
Auburn	X	X	X	X	X	X	X	
Clemson	X (26)	X (5)	X (8)	X (2)	X (2)	X (5)		
C. of Virgin Islands								
Florida A&M								
Fort Valley								
Kentucky State								
Langston								
Louisiana State	X (23)	X (4)	X (4)					
Mississippi State	X (28)	X (25)	X (7)	X (3)	X (3)	X (5)	X (5)	X (3)
North Carolina A&T								
North Carolina State	X (22)	X (22)	X (7)		X (2)			
Oklahoma State	X (15)	X (15)			X (3)	X (14)	X (3)	X (2)
Prairie View A&M								
South Carolina State								
Southern								
Tennessee State								
Texas A&M	X (17)	X (17)	X (4)	X (1)				
Tuskegee								
U. of Arkansas								
U. of Florida	X (6)	X (6)	X (2)	X (6)	X (6)	X (6)	X (6)	X (11)
U. of Georgia	X (59)	X (59)	X (2)	X (2)		X (59)	X (59)	X (64)
U. of Kentucky	X (62)	X (9)	X (25)	X (2)	X (3)	X (2)	X (1)	X (102)
U. of Puerto Rico	X (25)	X (5)	X (6)	X (2)				
U. of Tennessee	X (26)	X (5)	X (6)	X (2)				
Virginia Tech								
Virginia State								
Total	310	172	71	20	19	91	74	

did not respond to this section of the survey, but among the other 14, most offer advice on hardware and software selection and configuration, as well as introductory computer courses. Handouts and newsletters and workshops are the primary types of services offered. Other services include soil analysis, reports on disease identification and control, information about the profitability of farms and efficiency measures, herd management data and summary sheets, statistical analysis and other educational services. Thirteen of the Southern land-grant institutions surveyed either conducted no computer applications workshops for end users or did not respond to the question. A total of 310 workshops, with a total number of 13,388 participants, were conducted at the other 16 institutions. In 1980 only 15 were conducted, with 810 participating; in 1983 there were 180 workshops and 7,489 participants. See Table 13 for a breakdown by institution.

One of the most important survey questions requested a description of end users' current perceptions of the role of extension and research involvement in computer applications. The response from Kentucky State is indicative of most of the responses: "End users view extension as being responsible for disseminating useful information in a form that is understood by individuals at less than the college-trained level." The reply from the University of Florida says end users expect software development for their computers, the provision of training on the use of computers, help in interpreting and applying computer output, and the organization of science and associated technological information into data bases for their efficient and timely use. Most institutions reply more specifically that end users perceive the role of extension as a

TABLE 13

Number of Computer Application Workshops and Number of Participants, 1983, 1982, 1981, and 1980

Institution	Number of Workshops/Participants				
	1983	1982	1981	1980	Total
Alabama	2/35	None	None	None	2/35
Alcorn	None	None	None	None	None
Auburn	5/100	None	None	None	5/100
Clemson	25/375	5/150	1/60	1/85	32/670
Fort Valley	None	None	None	None	None
Kentucky State	2/50	None	None	None	2/50
Langston	None	None	None	None	None
Louisiana State	8/180	None	None	None	8/180
Mississippi State	25/929	37/893	6/113	3/45	71/1980
North Carolina	20/450	5/150	None	None	25/600
Oklahoma State	7/425	8/280	3/100	1/30	19/835
Tennessee State	None	None	None	None	None
Texas A&M	20/1400	8/1000	6/700	4/500	38/3600
Tuskegee	None	None	None	None	None
U. of Arkansas	5/370	2/300	None	None	7/670
U. of Florida	24/1250	3/125	None	None	27/1375
U. of Georgia	5/550	1/300	None	None	6/850
U. of Kentucky	17/670	16/540	8/260	6/150	47/1620
U. of Puerto Rico	None	None	None	None	None
U. of Tennessee	15/705	6/118	None	None	21/823
Totals	180/7489	91/3867	24/1233	15/810	310/13,388

*Institutions in the Southern region which did not respond are Florida A&M, North Carolina A&T, Prairie View A&M, South Carolina State, Southern, University of Arkansas at Pine Bluff, Virginia Tech, and Virginia State.

provider of assistance in hardware and software selection as related to various agricultural and forestry enterprises. The University of Kentucky also mentions two other expectations/perceptions of their end users': the development of software representing Kentucky agriculture and the distribution of software from other states. In general, extension programs at land-grant institutions are perceived as offering and making available objectivity, expertise, and support in computer applications and technology.

The distribution of software to end users is already in progress at about half of the institutions surveyed. This distribution, generally done on a diskette-exchange basis for a small fee, is done either directly to the end user or through an extension service, and much of the software distributed by a university is originally developed by another institution. Those categories of end users most widely served at this time are agricultural, followed by homemakers, community organizations, planning agencies, and others. Other services provided in addition to the software itself are handouts, newsletters and workshops for the purpose of advice on hardware and software, computer instruction, statistical analysis, soil analysis, and the service of other similar needs. As reported by a majority of the 29 land-grant institutions surveyed, end users expect a lot from their extension divisions: they expect assistance in microcomputer system selection, software selection, acquisition of public domain software, the development of useful software, educational activities, the interpretation of new advances in technology, rapid information exchange, and consulting.

SUMMARY OF CONCLUSIONS

As more and more farmers and other agricultural users purchase microcomputers, the need and demand for appropriate agriculturally-oriented software are rising. Agricultural colleges/divisions of the 29 Southern land-grant institutions surveyed are increasingly responding to these demands by developing, supporting and distributing software, as well as by offering programs for computer education. Survey responses indicate that end users expect the universities' extension and research departments to provide them with assistance in hardware and software selection, training on the use of computers, help in interpreting and applying computer output, and the organization of science and associated technological information into data bases for their efficient and timely use. Thus, in order to meet these expectations, the universities are in the process of developing effective programs in computer applications for end users. Each agency has different goals, objectives and priorities, but all currently have some type of computer applications program in progress.

Regarding degree and type of organizational structure used for the coordination and planning of computer projects, variety is great. Some universities are well advanced, already having established university-wide procedures, policies and standards. Other universities--presumably those where lower priority is attached to computer applications--have little or no established policy or structure. Most universities fall somewhere between these two extremes, with some form of computer coordinating

committee, departmental control, control through a department of agriculture computer center, use of the university computer center, program leaders or computer task forces.

Policies relating to computer application staff are also largely in the development stages. Again, programs for staff development and rewards are being developed at the extension, research and teaching levels in response to rising needs and demands. The level of expertise of staff in computer applications is similarly rising with demand; however only 5 percent of the total extension staff at all the universities surveyed were considered qualified by training and experience to provide substantial computer leadership to their clientele.

In the area of research and development of software for end users, approximately 10-11 of the 29 surveyed are active. Again, some have already formulated definite procedures and standards for documentation, review, language, hardware compatibility, etc., while others are much less structured. Apparently, 18-19 institutions do not give research and development of end user software a high priority at this time, so that they have few such projects ongoing.

Three brands of microcomputers--Radio Shack, Apple and IBM--are most widely used by the 29 land-grant institutions surveyed; and likewise, the same brands are those for which software is being developed and distributed. Some universities have set standards defining those operating systems, languages and equipment for which they will develop/distribute/support software, while others only report that they "emphasize" certain specifications. A measure of standardization exists regarding microcomputer hardware, since three particular brands of microcomputers

are much more widely stressed by software developers/distributors at these universities.

Distribution of software to end users is in progress at about half of the institutions surveyed. Categories of end users most widely served at this time are agricultural, followed by homemakers, community organizations, planning agencies, and others. Other services provided relate generally to computer awareness education.

In summary, the current state of computer applications aimed at the end users in progress at the 29 Southern land-grant institutions is largely developmental. According to survey results, Mississippi State, Texas A&M, the University of Kentucky, University of Georgia, University of Florida, North Carolina State, Oklahoma State and Clemson are leaders, having already established organizational units to develop, maintain, support and distribute computer software to end users. Even these leaders, however, stress the fact that further development is an ongoing, neverending process at their institutions.

As other states follow in the development of similar programs, resource sharing becomes increasingly desirable. Many common features already exist among the universities in their computer applications program, and in some cases, this leads to duplication of effort. On the other hand, these similarities, once defined, inventoried and thus harnessed, promote resource sharing and centralized standards through software inventories, personnel inventories, documentation standards, hardware standards, language and operating systems standards, and training programs. The survey indicates that, although there is a wide variety of work being done among the universities, interest and demand definitely

exists in further development of resource sharing, for the ultimate purpose of improving delivery of computer software and services to the agricultural community.

SURVEY OF CURRENT STATUS OF
EXPERIMENT STATION-EXTENSION SERVICE-RESIDENT INSTRUCTION
COMPUTER APPLICATIONS

State _____ Date _____

Person(s) Completing Form/Phone Numbers

_____

_____

PART I--COMPUTER APPLICATIONS FOR END-USERS

1. Do you distribute software to end-users? Yes ____ No ____ If no, go directly to Part II.

2. List and check types of end-users served. Indicate number of programs currently available for each group.

Category	Check if served	Number Software Programs Available
a. farmers	_____	_____
b. agribusiness	_____	_____
c. homemakers	_____	_____
d. community organizations	_____	_____
e. planning agencies	_____	_____
f. agricultural agencies	_____	_____
g. agricultural associations	_____	_____
other		
h. _____	_____	_____
i. _____	_____	_____
j. _____	_____	_____
k. _____	_____	_____
_____	_____	_____

3. What amount of computer software program development is performed on campus by extension specialists, computer specialists, researchers, teaching staff for end users?

Department Name	No. of People that Spend Time Designing or Coding Programs (hours per week)				Primary Responsibility of People Designing or Coding Programs (give number)				Number of Locally Developed Programs	
	>20 hours	5-20 hours	<5 hours	Total People	Extension	Research	Teaching	Total People	In Use	Under Development

4. Describe your "in-state" software distribution policy guidelines in terms of operating system, languages, fees, etc.

5. Describe your policy for distributing software to other states. Specifically, do you distribute directly to clientele, or do you go through Extension professionals in those states, or do you use some other procedure?

6. Describe your review process for software that is distributed to end-users, if any. If none, please state.

7. Which resources are easiest for you to acquire: (a) computer hardware or (b) professional staff to support computer applications? Please explain your situation.

8. List the different brands of computers for which you provide software and the number of programs you have available for each.

	BRAND OF MACHINE	OPERATING SYSTEM	NUMBER PROGRAMS AVAILABLE
a.			
b.			
c.			
d.			
e.			
f.			
g.			
h.			
i.			
j.			
k.			

9. a) How many farms in your state gross over $100,000 per year? _____

What is your best estimate of the percentage of these farms with on-farm computers? _____

b) How many farms in your state gross less than $100,000 per year? _____

What is your best estimate of the percentage of these farms with on-farm computers? _____

c) How many agriculture producers are there in your state? _____

PART II EDUCATIONAL INFORMATION, DISSEMINATION AND TRAINING

1. Describe your end users (cliente's) current perceptions of the role of extension and research involvement in computer applications. (i.e., What do they see you doing?)

2. Do you provide computer services (other than software) to end users? Yes _____ No _____
If yes, describe what services you provide.

3. Indicate the number of computer applications workshops conducted for end users in your state.

Year	Number Workshops	Estimated Total Attendance
1983		
1982		
1981		
1980		
Total		

4. Describe any training programs in computer applications for your staff.

   a. Extension

   b. Research

   c. Resident Instruction

5. What is the estimated level of District, Area, and County Extension Staff Expertise in Computer Applications

Level of Expertise	CATEGORY					
	District Administrative Staffs	Area Subject-Matter Specialists / Agents	County Agricultural Agents (include Associates / Assistants)	County Home Economics (include Associates / Assistants)	County 4-H / Youth (include Associates / Assistants)	Total
Number Qualified by training and experience to provide substantial computer leadership to their clientele						
Number Familiar with computers but not ready to offer leadership programs						
Number Not yet familiar with computers						
Total Number in Category						

PART III ORGANIZATION AND EQUIPMENT

1. Do you have a coordinated organizational structure for computer applications throughout the College or Division of Agriculture including research, extension and resident instruction?

   Yes_____ No _____

   a. If YES, describe the structure indicating both administrative and functional lines of authority. Specifically include any mechanisms or procedures for joint work between extension, research, and resident instruction.

   b. If NO, describe your organizational structure for computer applications in each area, extension, research, and resident instruction. (Attach separate sheets if necessary.)

      (1) Extension

      (2) Research

      (3) Resident Instruction

2. Specifically, do you have

a. A university-wide computer coordinating committee? Yes____ No ____

b. A college of agriculture-wide computer coordinating committee? Yes____ No____

c. An experiment station computer coordinating committee? Yes____ No____

d. An extension service computer coordinating committee? Yes____ No____

e. A resident instruction computer coordinating committee? Yes____ No____

f. Some other arrangement. Please describe.

3. List your priority areas for computer applications in research, extension and resident instruction.

Organizational Unit	Priority areas of Emphasis
a. Research	
b. Extension	
c. Resident Instruction	

4. Describe how your reward system functions for professionals involved in end user software development and distribution.

   a. Agricultural college or division level.

   b. University level.

5. Indicate the amount of computer program development effort performed on the campus by researchers, extension specialists or teaching staff. (Use additional sheet if necessary.)

Department Name	Intended Audience			Number of People Spending Time designing or coding programs by number of hours per week			Number of Locally Developed Programs by Department	
	Extension	Research	Teaching	Number More than 20 hours	Number 5-20 Hours	Number Less than 5 hours	Number In-Use	Number Under Development

6. List the computer equipment available for the Division or College of Agriculture (Include elements of agriculture, home economics, community development and 4-H & Youth not organizationally in Agriculture if such a situation exists). Be sure to include all research, teaching, and extension.

Type of Equipment	Number Available	Model Used	Manufacturer	Owned By*	Operated By**	Primary Users***	Current Status****

*Indicate if owned by the Experiment Station, Extension Service, College
**Indicate who primarily operates the equipment, i.e. Department or Centralized
***Indicate whether Extension, research, or resident instruction
****Indicate if (1) installed (2) on order (3) to be disconnected (4) replaced (5) other--describe

7. Does your state purchase contract regulate the purchase of microcomputers? Yes___ No___

   a. If yes, do they specify a brand? Yes___ No___

   b. If a brand is specified, what brand _____.

8. Indicate what other computer facilities are used by the extension, research and resident instruction staff.

Computer Facilities Used	Check Staff Using Facility			Approx. hours used per month	Primary reason for using facility egg. problem solving, program development, special data, capacity
	Extension	Research	Resident Inst.		
a. On-campus administrative system					
b. On-campus academic system					
c. Remote time-sharing system					
d. Service Bureau					
e. Other state or federal system					
f. AGNET (Nebraska)					
g. TIPLAN (Michigan)					
h. CMN (Virginia)					
i. WISPLAN (Wisconsin)					
j. other					

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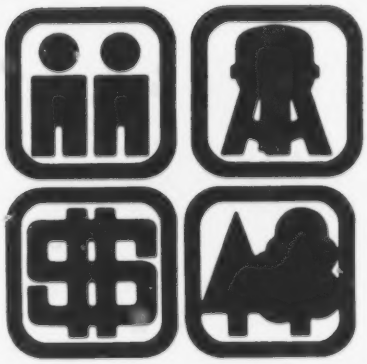
The SRDC is one of four regional rural development centers in the nation. It coordinates cooperation between the Research (Experiment Station) and Extension (Cooperative Extension Service) staffs at land-grant institutions in the South to provide technical consultation, research, training, and evaluation services for rural development. This publication is one of several published by the Center on various needs, program thrusts, and research efforts in rural development. For more information about SRDC activities and publications, write to the Director.



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